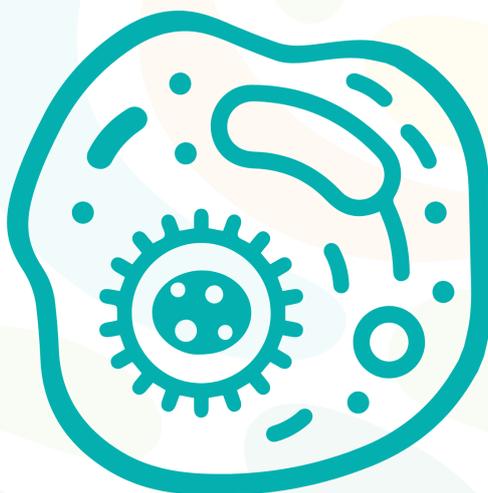




BRAINIACS OLYMPIAD

GRADES 9-10

BIOLOGY SAMPLE PAPER (PRACTICAL PART)



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BIOLOGY SAMPLE PAPER – PRACTICAL PART

Grades: 9–10

Time: 120 minutes

Total Points: 100

Equipment: *Stopwatch*

TASK 1 [50 points]

PART 1. INVESTIGATION (HUMAN PHYSIOLOGY) [28 points]

Effect of Physical Activity on Pulse Recovery

During exercise, muscles require more oxygen and energy. This affects pulse rate.

You are going to investigate the effect of **running in place for 1 minute** on pulse rate.

Apparatus:

- Stopwatch

(a)

(i) The student measured pulse rate after exercise.

Record the results in the table below. [8]

Time after activity (min)	Pulse rate (beats per minute)
0	
3	
5	
7	

(a)

(ii) Draw a line graph of time after activity against pulse rate. [8]

Include:

- Correct axes
- Units
- Suitable scale

(a)

(iii) Write two conclusions that can be made from the results. [4]

(a)

(iv) Identify: [4]

- Independent variable
- Dependent variable

(a)(v) State two factors that should be kept the same during this investigation. [4]



PART 2. GENETICS & DATA HANDLING [10 points]

Inheritance of Flower Colour

Flower colour is controlled by a dominant allele **R** and a recessive allele **r**.

Two parent plants are both heterozygous (**Rr**).

(a) Draw and complete a Punnett square to show all possible genotypes of the offspring. [4]

	R	r
R		
r		

(b) State: [3]

- The **genotypic ratio**
- The **phenotypic ratio**

(c) Explain why some offspring do not show the recessive flower colour. [3]

PART 3. PLANT PHYSIOLOGY [12 points]

Mineral Uptake in Plants

Plants need mineral ions from the soil for healthy growth.

**(a) The diagram shows a seedling root placed on a grid.
(diagram provided in the exam paper)**

**(i) Estimate the area of the root tip using the grid.
Count only the squares that are more than half covered. [4]**

(b) A student investigated the effect of nitrate concentration on plant growth.

Nitrate concentration (units)	Increase in plant height (cm)
Low	2
High	6

(i) State one conclusion from the results. [2]

(ii) Explain why nitrate concentration affects plant growth. [4]

(c) Identify: [2]

Tissue that transports mineral ions and water

Tissue that transports sugars made in the leaves

TASK 2 [50 points]

MICROBIOLOGY & ECOLOGY (PLANNING)

Effect of Temperature on Bacterial Growth

Microorganisms grow at different rates under different environmental conditions.

Plan an investigation to test:

The effect of temperature on the growth of bacteria on agar plates

You may use:

- Agar plates
- Cotton swabs
- Incubator or warm place
- Refrigerator
- Marker pen

Your plan must include:

Aim

Independent variable

Dependent variable

Method

One safety precaution

How results would be recorded

Space for answers:

Aim:

Independent variable:

Dependent variable:

Method:

Safety precaution:

Recording results:

END OF PAPER